



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche

07477

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

Distr.
RESTRICTED
UNIDO/IOD.85
4 March 1977
ENGLISH

- 07477

CEMENT DEVELOPMENT AND RESEARCH CENTRE*

TURKEY

DP/TUR/72/034

Mission report

by

G.M. Idorn, expert in testing cement and raw materials

Prepared for the Government of Turkey on behalf of the
United Nations Industrial Development Organization,
for the
United Nations Development Programme

*This report has been reproduced without formal editing.

id.77-1268

Explanatory notes

The following abbreviations are used in this report:

ASTM	American Society for Testing and materials
ISO	International Organization for Standardization
RH	relative humidity
SRR	standard reference research

ABSTRACT

This is the report of a mission to Turkey undertaken as part of the United Nations Development Programme (UNDP) project "Cement Development and Research Centre" (DP/TUR/72/034) of which the United Nations Industrial Development Organization (UNIDO) was the executing agency. Under the provisions of the project the expert carried out his mission from 3-13 December 1976. His duty was to assist in establishing the concrete technology laboratory at the centre.

A system approach to selection of equipment for the concrete technology laboratory at the centre is proposed and described.

Supplementary equipment available in other sectors of the centre is mentioned.

Refined instrumentation for later expansion of the research is listed.

Discussions with the centre architect on installations are briefly referred to.

It is proposed to arrange for selection of special reference sand, gravel and cements as basis for the research.

The arrangement of an outside area for educational courses regarding concrete technology is recommended.

The background and particular aspects of problems in the establishment of the concrete technology sector of the centre are outlined.

The recommendations regarding the main principles and objectives for the sector are presented as a background for discussions of staff-policy and employment arrangements. Motivated proposals for employment scheme 1977 are given, including expert consultancy and missions. The employment scheme for 1978 is outlined.

The underlying principles and criteria for making the centre used and useful from the outset are described. Ways and means to make the work effective are described, with emphasis on an integration of the various specialities in the sectors of the centre, and on the ties to the outside world.

A scholarship for a documentalist is foreseen to commence in 1977.

A proposal is outlined for outside assistance to the management in the build-up phase of the Turkish identity of the centre.

CONTENTS

<u>Chapter</u>		<u>Page</u>
I.	FINDINGS	5
	A. Equipment for concrete technology laboratory ...	5
	B. Development of the concrete technology centre...	10
	C. How to ensure returns on the cement and concrete development investments	15
II.	RECOMMENDATIONS	21

Figures

I.	Layout and flow chart for the concrete technology laboratory	6
II.	Development plan for various categories of activities.	18

I. FINDINGS

This is the report of a mission to Turkey undertaken as part of the United Nations Development Programme (UNDP) project "Cement Development and Research Centre" (DP/TUR/72/034) of which the United Nations Industrial Development Organization (UNIDO) was the executing agency. Under the provisions of the project the expert carried out his mission from 3-13 December 1976. His duty was to assist in establishing the concrete technology laboratory at the centre.

A. Equipment for concrete technology laboratory

The basement and the ground floor of the building for concrete technology is already erected (reinforced concrete). The design of installations, the "flow-operation of materials" during examination and testing (see figure I), and the placing of machinery and instruments were discussed with the architect.

The following leading principles were recommended as guidelines for the concrete technology laboratory:

(a) It will aim at the highest possible accuracy and efficiency in its research, in educational and testing activities. Likewise, it shall qualify for demonstration purposes at courses etc. To the extent possible it will perform special examinations and research on request from outside, when its particular qualifications motivate such services;

(b) It will deal exclusively with concrete technology (including supplementary materials' technology), and not with structural research and testing or design of concrete buildings and structures etc.;

(c) To the fullest possible extent it will act supplementarily to concrete technology research etc. going on elsewhere in Turkey.

These conditions strongly point to a system-laboratory for building materials as an optimum solution. The primary advantages of the system approach are as follows:

(a) The system constitutes a rational "flow of operations" and minimizes internal transports which always represent sources of errors;

(b) The system can be installed with a minimum of fixed positions for instruments and machines, giving a maximum degree of flexibility at the commencement and for future changes. (Only the largest mixer and the testing machines may require fixed locations.);

(c) The system requires a minimum of lifting/moving cranes and trailers because the internal transportation is kept at minimum. (No fixed crane is necessary.);

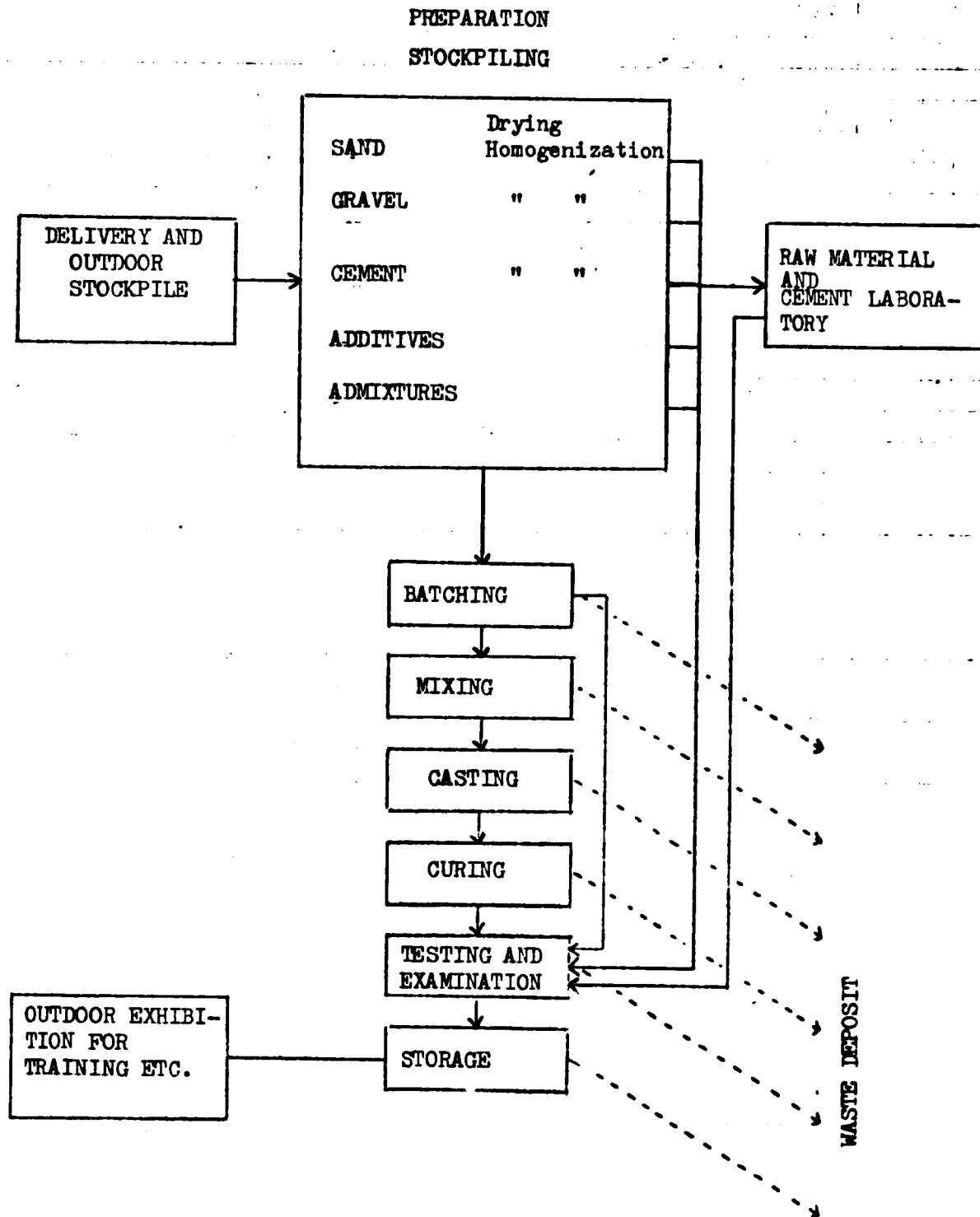
(d) The entire set of instruments and machines has one supplier. Quality, experience and good service can be offered;

(e) Advisory service including final specifications, complete installation service and "running-in" support can be offered;

(f) Educational training for staff can be offered before take-over;

(g) Continuous service for the whole system will be available.

Figure I. Layout and flow chart for the concrete technology laboratory



A list of selected instruments and machines in the system solution is given below.

Aggregates:

Sample splitter
Drying pan
Weight balances (30 kg max., 150 kg max.)
Sieves (ISO/ASTM) 200 mm diam. with motorized shaker
Sieves 500 mm x 500 mm with motorized shaker
Precision weight, max. 10 kg
Closed compartment for precision weight balance
Drying cabinet, temperature regulated, max. 7 - 800 litres
Infrared hygrometer

Fresh concrete:

Slump test unit
Vebe meter
Weight balance (on trailer)
20 cm x 20 cm x 20 cm cube moulds (24)
30 cm x 15 cm diam. and 20 cm x 10 cm diam. cylinder moulds (24 each)
Air-pressure meter
Vibratory table
Compulsory mixer 50 litres
Compulsory 250 litre mixer with elevator
Elutriation sieve set
Fiberglass-reinforced plastic tanks with thermostats, 2 m x 1 m x 1 m

Hardened concrete:

Transport trailer
Weight balance (cubes/cylinders)
Roller way (cubes/cylinders)
Surface gauge
Compressive test machines (50 tons and 500 tons with measuring and control stand)
Core extraction apparatus
Rock cutting saw
Pulse velocity instrument

Transport vehicles:

- Movable hydraulic trailer crane (2.5 tons)
- Battery motored truck for pallets etc. (2.5 tons)
- 2 or 3 hand moved trailers

This list does not cover the field of cement testing, because cement testing is to be established in the cement technology laboratory. However, it is recommended to invest in a mobile cement testing laboratory. This solution makes it possible to provide a beneficial "follow-up" testing service to the cement plants, which can otherwise often not comply with the requirements for their testing owing to inadequate facilities and staff capability. The movable laboratory could also function as a traveling basis for educational courses.

Technical details of the specifications are not necessary for the further erection of the laboratory building. Therefore, it is recommended to arrange for a tender as fast as possible, so that negotiations on terms of delivery etc. could be opened up in accordance with the project budget etc.

Supplementary equipment

The equipment described above is sufficient for ordinary examinations and testing with concrete-engineering orientation. Industry and development orientated research requires utilization of supplementary equipment which is foreseen to be available in the other buildings of the centre. The location of supplementary equipment can be decided later on, in case not all items should be available from the outset.

During the future work of the center, its capability ought to develop so as to motivate purchase of the more refined instruments. There is no need to reserve any particular placement of these instruments at the present time. A list of supplementary equipment is given below.

Concrete research instruments to be available elsewhere in the centre:

- Scanning electron microscope with supplementary instruments
- X-ray diffractometry

Light microscopes

Reflected
Transmitted
Stereo

Atomic absorption

Wet chemical analysis

Calorimeters

Cement testing equipment

Video tape recorders

Tape recorder

Photo/film equipment

Projectors

Data processing/computer equipment

Concrete research instruments for future purchase:

Testing machine

Thin section machine

Advanced calorimetric instruments

Electronic registration instruments according to needs

Comments on installations

The following matters were discussed with the architect:

(a) There must be a drying room for sand with hot water circulating in pipes in the floor;

(b) The curing rooms, one for 20°C, 100% RH, and another for 20°C, 65% or 60% RH, must be very carefully designed. Humidifier must be powerful in 100% RH room as net 100% RH is necessary to secure controlled hardening. The rather dry climate of the Ankara area makes this precaution essential for the quality level of the work;

(c) The batch-mixing arrangement must be specified according to any particular choice of equipment;

(d) A heavy working table of reinforced concrete is recommended for making concrete test specimen. Size 2 m x 5 m, convenient height;

(e) Around larger instruments and machines there ought to be enough space for 20 - 30 course attendants to assemble for demonstrations;

(f) The sewer system must be designed to take large quantities of "mud" and slurries, which will tend to thicken and harden in the pipes. Frequent cleaning must be induced and rigorously maintained.

Standard reference research materials

Special sands, gravels and cement must be specified, selected, produced under control, bought in quantities and then stored, homogenized and tested, so as to be used as standard reference research materials (SRR) for all research experiments aiming at general studies of cement and concrete characteristics.

The SRR materials must be used for reference when actual field materials are examined and evaluated.

Likewise, exclusively SRR materials must be used for special SRR test specimens for testing accuracy levels of other laboratories.

External training area

It is strongly recommended to arrange for an external training area to be established close to the concrete technology building. A suitable area of 20 m x 30 m should be reserved for this purpose.

The area is to be used for large scale concrete making exercises simulating work conditions in connection with training courses, to be arranged by the centre or by any larger contractor or agency that might wish to pre-test materials for large construction jobs.

The equipment for the area should be defined and specified only when a principal decision as to the activity concerned is arrived at. Rental of equipment may prove a reasonable solution.

B. Development of the concrete technology sector

The cement industry orientated sectors of the centre are becoming serviceable for the cement production. The concrete technology sector is as yet less progressed. Its future activity will in several aspects differ markedly from the raw materials and the cement manufacturing orientated work. This section outlines and motivates the functions of the concrete technology sector so as to make it an advanced service and development offer from the Turkish cement industry to its customers and to the national development of building and construction in general.

The task to create an engagement and confidence on the part of the users of the concrete technology activities is considered a major function of the centre. It is a difficult set of complex tasks that must be tackled with skill, dedication, and diplomatic patience on the part of the executives concerned.

It is recommended that the highest possible acceptance of the service and research centre be generated. The faster a genuine national identity becomes recognizable the better, also in the international enterprises in co-operation with national.

Cement versus concrete development

The project has so far concentrated on the establishment of the planned facilities and expertise for services to the cement industry, i.e. the raw-materials and the cement manufacturing orientated activities. This complies with urgent demands from the industry that is under continuous pressure to expand in accordance with the national needs for the growth of the concrete building and construction sector. The objectives for the centre operations have two important characteristics:

(a) The market for the services (the number of customers) will remain limited to cement industry companies and their technical staff-members. This means that utilization of examination and testing and transfer of the technology know-how etc. will deal with maximum 1,000 to 2,000 technical staff members of all grades of education and responsibility. (In the long run certain aspects of the work will find broader application, by means of cement-information service etc.);

(b) Research on cement manufacture will be predominantly related to cement manufacture equipment and thus an objective for the mechanical engineering firms, rather than the cement industry. However, in the long run creativity and inventions may lead to innovations in the cement manufacture technology.

The concrete technology sector of the centre must be planned to work as follows:

(a) The market for the services (the number of customers) should comprise thousands of engineering and building firms from some of the nations largest corporations down to village craftsmen, individual farmers etc., also, research and teaching in universities and high and technical schools, authorities in government technical departments and institutes, and foreign importers of products and technology. This market should be as far reaching as are the markets for national building and engineering sectors;

(b) The concrete technology development should be open to a broadly varied creation of new manufacture methods, new materials' combinations, and considerable advance of process technology, instrumentation and monitoring systems etc.

This development should be available to anybody involved in the concrete and concrete materials fields of enterprise, and not only to larger machinery making corporations. The potential is not exploited even in more industrialized countries, so that an aggressive concrete research policy on the part of the centre can become a major asset to the fast development of the utilization of resources for concrete such as primary materials, energy, capital and human skill and knowledge.

One must be aware that the direct profitability of the development of cement use from the cement industry point of view is inevitably on the users side. The returns to the cement makers come indirectly and with time lags, through increased consumption and qualified co-operation with the customers.

Concrete technology development

Engineering, testing and examination of cement and concrete in the public and private sectors are carried out diligently and effectively in existing institutes, although, hampered by the lack of capacity and skilled manpower owing to the fast expansion of the cement and concrete consumption. The professionals concerned would naturally like to have more time and facilities to do research in depth on some of the problems they are requested to deal with. But the pressure from the growth in public construction work will probably absorb any possibly available increase in manpower and instrumentation to do short-term examination and testing work for years to come.

The universities are intensely occupied by meeting the increasing demands for skilled engineers. The impressive development of concrete construction works, high concrete buildings, and housing schemes in Turkey bear witness of considerable success on the part of concrete engineering and architectural education.

It is recommended to begin the concrete technology work of the centre with immediate service, urgently needed by a large group of customers. At the same time the centre should aim at a rapid creation of a scientific environment for industry research and development. Such a policy of commencement can be specified into the following recommendations:

1. Testing and examination methods and instrumentation for concrete materials and concrete should be developed. This includes development of reference materials and methodology for evaluation and recording of observations etc.

Direct technical services, courses and subscription to comparative testing etc. should be established for broad transfer of the achievements.

2. Assessment of the physico/chemical and mechanical principles and processes and of the desirable and deleterious characteristics of concrete and concrete materials. Accomplishments in these matters should be communicated to practice as background knowledge and stimulation to establishment of concrete research programmes and projects suitable for Turkish engineering needs and wishes.

Direct collegial contacts, seminars, courses, publications and larger meetings plus intensive participation in international research and development should be used as means of transfer of achievements and of accumulation of needs from practice.

Memberships in international concrete societies etc.

3. Dissemination of knowledge from own work and from abroad to professional and unskilled personnel.

Brochures, courses, films, articles, demonstrations etc. should be used for such dissemination.

Appointment of a special education officer.

4. Co-ordination of own work with supplementary activity elsewhere in Turkey. Encouragement of collegial co-operation. Creation of a Turkish concrete society (membership basis, but support from the centre) and a concrete journal for promotion of the national development.

5. Establishment of research scholarships to provide for exchange of professionals and for temporary employment at the centre of engineers from practice.

Special government (scientific agencies) and industry (industrial promotion agencies) support should be given for such schemes.

6. Creation of a continuous dialogue between the centre and its national environment by appointment of an advisory committee with the dual objective to advance the utilization of the accomplishments and the proper scientific research.

The advisory committee should comprise executives from the sponsors, the academic and the public research and from engineering practice.

7. Appointment of an international advisor for the centre for the first 3 years of activity, in order to secure the transfer of advanced knowledge and experience from the international development to support the national evolution of a vivid cement and concrete development.

Staff for concrete technology laboratory
and external services

The further erection, selection of equipment, installation work etc. are now urgently requiring assistance to the project management and to the architect of a future leader of the concrete technology section of the centre. The potential leader of the section can find technical support to accomplish the immediate tasks by appointment of an expert to work with him and with the architect etc. under the present project management. However, for his future role as a section head, he must be further trained by means of a scholarship, international visits and contacts, personal studies and so on.

The following schedule of recruitment for 1977 is recommended:

Criteria for selection, and work-description for future section leader to be worked out and agreed upon by the Turkish authorities concerned.

Operational: 1 March

Advertising, selection among candidates and employment agreement to make employment commence: 1 May

Expert stay for assistance to employed section leader. Recommendation regarding job-description and expert selection ready: 1 March

Expert operation 2 months from: 1 May

Study visits abroad for designated section head commencing: 1 October

Selection and employment by designated section head and expert of:

1 technician	} operational:	1 July
1 workman		

The following further recruitment for 1978 is recommendable at the present time, but is to be revised and specified not later than 1 September 1977. To commence employment by 1 January 1978:

- 1 research professional (chemist/physicist)
- 1 technology engineer (civil engineer)
- 1 training, publication and documentation officer (background to be decided later)
- 1 technician
- 1 workman

C. How to ensure returns on the cement and concrete development investments

This section of the mission report covers the creation of the future life of the centre. Whereas the existing UNIDO-project and supplementary arrangements are primarily dealing with the physical establishment of the centre hardware, i.e. buildings, instruments and specialists, this section concentrates on the effort required to make the hardware investments useful.

The expert is of the opinion that there is an urgent need to commence very soon a determined effort for giving the centre a Turkish identity. This is purposely emphasized in this section of the report. Discussions on this theme confirm the belief that Turkey has a considerable unexploited reserve of intellectual capability. Given qualified management and support, the project will stand good chances for fulfilment of its role. It follows that if the above philosophy becomes realized then the proportion of foreign experts will begin to decrease already in 1977. One consequence will be that the integration of national specialists into a managed system approach can begin, another that this can be associated with national pride and dedication for the future work. Finally, early taking over by national teams of professionals and assistants enables delegation of leadership, and a more flexible organisation than possible while short-term experts' dependability prevails.

Criteria for quantitative development of the centre

Supplementary to locally conditioned criteria for evaluation of the necessary economy input to the centre over a reasonable period of time, say 5 years from the inauguration, it is recommended to consider experience from elsewhere.

It is general experience that industries in the consumer goods sectors (food, electronics, pharmaceutical articles) must spend about 8 to 15 per cent of annual sales on research and development. Heavier industries such as machinery, pulp and paper etc. spend less, generally 2 to 5 per cent.

Building and construction industries belong to the most slowly developing industry sectors and a figure of 0.5 to 1 per cent of annual sales is true only if creative innovation in smaller firms and on the part of craftsmen is included. The trend is, however, that much more refined, industry managed research and development than before is becoming necessary to advance the materials' technology development.

As for the centre it seems reasonable to accept that from the outset there is but little "counterpart" in practice to work with. Therefore, capacity to offer service and education beyond the build-up of the centre itself is necessary.

Moreover, the internal build-up requires for the first period of, say 5 years, an exceptional effort including much education of staff etc. and communication with the outside world. Accordingly, a level of income for the centre of about 1.5 to 2 per cent of the annual cement sales seems a recommendable proposal for discussion.

It should be considered that the customers of the institute, by being charged for direct services, can in the course of some years decrease the direct financial support from the sponsoring association. This is of interest in relation to an investigation in the United States, which showed the following average distribution of expenditure to research and development in various industries: 15%, exploratory; 25%, innovative; 65%, trouble-shooting. Transferring this experience to the centre it

should be realized that exploratory and innovative research must start low and grow slowly and that trouble-shooting or services to the industries are urgently needed and could be performed from the outset, particularly owing to the aid from foreign experts.

For the centre, a five-year development plan for the categories of activities as shown in figure II is recommended.

Criteria for qualitative development of the centre

The upper section of the figure, development of short-term technical service and education to the cement and concrete enterprises in Turkey, should be performed under strong ties to engineering and industry practice.

The lower section of the figure shows an equally strong demand on friendly and intense ties to the world of science and background research elsewhere.

The two sections must also be strongly integrated, so as to make all concerned see the centre as an entirety, and not as a practical (useful) part separate from a theoretical (not useful) part.

To create this extrovert and introvert hegemony should become a primary goal for the management, and the staff, of the centre. It is a challenge to personalities more than to budgets and instruments, and there are many warning examples of failures in this field.

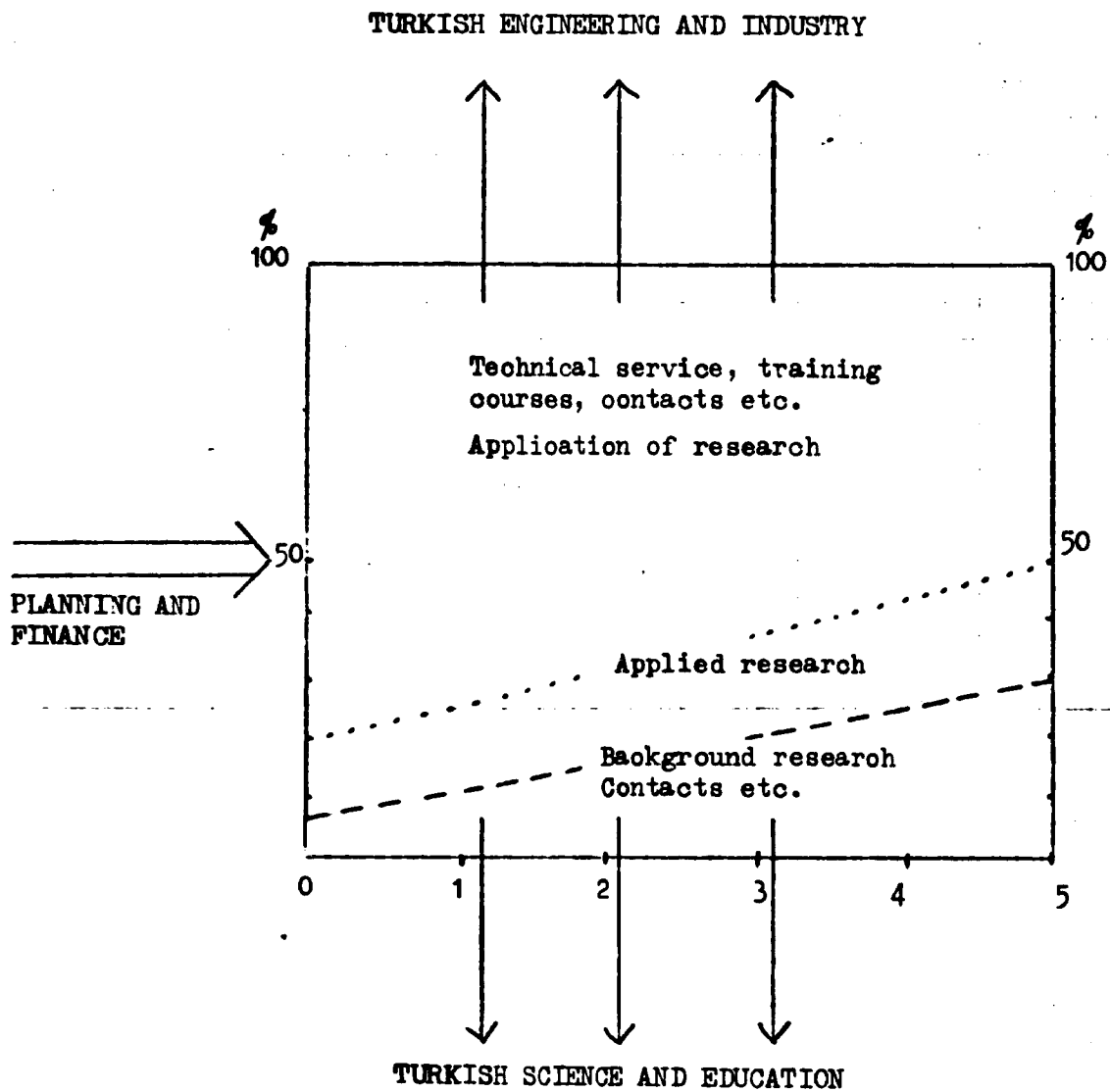
There are experiences elsewhere to make use of, but it is essential that the management devotes itself to give the centre a recognized national identity.

The commitment to establish and pursue a forceful manifestation of the intents that are preliminary realized in buildings and instruments should therefore be made clear and firm by the authorities concerned.

Ways and means for qualitative development

The competence and consciousness in the daily work of the centre are the things that come with the right selection of staff, introduction of a clear but flexible style of project management, budgetary control,

Figure II. Development plan for various categories of activities



Note: The relative proportions shown between the categories of activities should be adjusted in accordance with the quantitative potential and the needs deriving from the adherence of the research institute to its environments in practice and in the academic world.

review of work etc. The contact and integration with the customers depend hereon, but do not develop without further efforts, acquired knowledge etc. At the present stage only the following brief outline of externally orientated activities can be recommended:

Turkish concrete society. Given the centre's support, but not leadership, such a society could grow into a most important national forum for engineering and industry development. Also, it could become very useful for international co-operation.

Rewards for outstanding achievements in cement and concrete development. Architects, engineers, professors, cement plants, workmen and students could be given a reward for excellent and exceptional accomplishments. Given a high authority (National Council of Science?) and public mentioning such a gesture could markedly stimulate the national identity of the development.

Training courses, publications and documentation services. A very intense activity in these aspects of the work could help to overcome a major barrier against response on the part of the recipients. Training courses should primarily be practice-orientated. Publications should be both popular and for specialists. Movies for educational purposes can be obtained from several countries.

Meetings and congresses. Meetings make contacts, confidence and an environment of multitude. At least one annual meeting should be arranged so as to present the centre to the outside world and secure feed-back reviews of its work and links. Congresses would serve to make the centre a member of the international "family" of research and development regarding cement and concrete and attract research and industry from abroad to make contacts. A presentation congress could be considered already in 1978 covering, for instance:

- Part I - Cement and concrete in Turkey. At present and in perspective
- Part II - International trends of development in cement and supplementary industries

Addition of temporary staff. The presence of young engineers from practice and of professors serving sabbatical year could be an important

asset for the centre both in the increase of the activity with only minor budgetary expenses, and in the advance of the exchange and contact, thus preventing isolation and inducing all the time impulses from outside.

Joint-venture projects. At a certain level of competence it may become profitable for the centre to enter into multi-sponsored development projects, so as to gain experience in accepting direct measurable development responsibility.

Documentation service. From the outset an internal, modern documentation/library service is necessary. This can advantageously be escalated to offer external service in the course of some years. Scholarship for training abroad and, possibly, expert service will be required in 1977, if no national expertise is found available.

Assistance from outside. As emphasized above, a primary element of the development of the centre is to create a national identity. Therefore, outside aid to the management and programme establishment should not be a direct take-over executive function. It is estimated that a consultant service will be needed for 3 to 4 months in each of the years 1977, 1978 and 1979. The service could include pragmatic assistance to the management with regard to programme and project selection, staff education etc.

II. RECOMMENDATIONS

A. Equipment for concrete technology laboratory

1. Laboratory equipment to be purchased as system-laboratory such as offered by a firm of many years' experience and supreme reputation.
2. Movable cement testing equipment to be purchased as system-laboratory solution in truck/trailer.
3. Concrete research requiring physio/chemical investigations to rely on equipment in other sectors of centre, so as to avoid duplication.
4. Special, refined concrete research and testing equipment to be purchased at a later stage of establishment.
5. Special sand, gravel, cements to be selected and processed for use as reference research materials.
6. External area to be selected for educational concrete making simulating job conditions. No special equipment required at present.

B. Development of the concrete technology sector

The concrete technology research and other services to be concentrated on materials' technology and to commence with:

1. Development of testing and examination methods.
2. Assessment of principles and processes constituting the basic knowledge regarding concrete technology.
3. Dissemination to engineering practice of acquired knowledge so that application be stimulated.
4. Co-ordination with concrete research elsewhere.
5. Establishment of research scholarships.
6. Creation of intense, continuous dialogue with the national environment. Appointment of an advisory committee.
7. Appointment on a three-year term of an international advisor to the centre management regarding the creation of its identity as a Turkish centre.
8. The concrete technology staff is to be selected and employed gradually as follows:

(a) Criteria for selection and work description for section leader to be worked out and accepted by 1 March 1977. Advertising, interviewing and selection to be completed, and employment to begin, by 1 May 1977;

(b) Expert for initial assistance (2 months) to section leader, effective by 1 May. (Study visits abroad for section leader effective from 1 October 1977);

(c) Selection and employment (by section leader and expert) of 1 technician (effective by 1 July 1977); 1 workman (effective by 1 July 1977);

(d) Special consultant service to:

Prepare selection criteria and work description etc. for section leader

Recommend Danish expert as assistant to section leader

Prepare draft proposal for 1978 employment scheme.

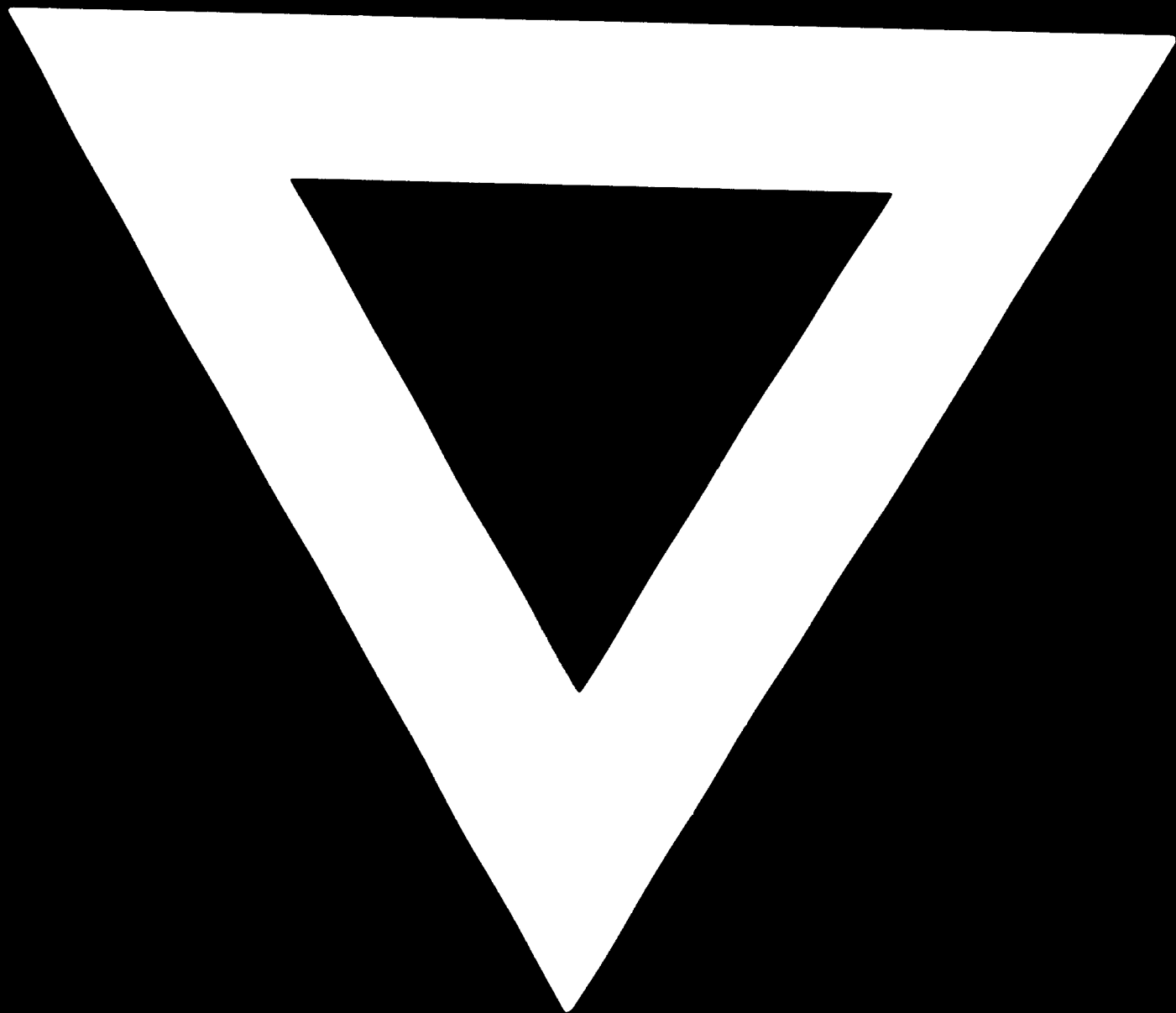
C. How to ensure returns on the cement and concrete development investments

As ways and means for qualitative development of the Turkish Cement Manufacturers Associations' research and services:

1. Support to creation of a Turkish Concrete Society.
2. Offering of rewards for outstanding accomplishments regarding cement and concrete.
3. Establishment of training courses, publications and documentations services.
4. Arrangement of meetings and congresses.
5. Employment of temporary staff.
6. Joint-venture projects.
7. Building-up of a modern documentation service.



G-344



77. 10. 05